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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/892,500	06/28/2001	Toru Hosoi	PNDF-01095	3231

21254 7590 07/31/2003
MCGINN & GIBB, PLLC
8321 OLD COURTHOUSE ROAD
SUITE 200
VIENNA, VA 22182-3817

EXAMINER

SUCHECKI, KRISTYNA

ART UNIT PAPER NUMBER

2882

DATE MAILED: 07/31/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/892,500

Applicant(s)

HOSOI, TORU

Examiner

Krystyna Suchecki

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-- The MAILING DATE of this communication appears on the cover sheet with the correspond nce address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,4 and 10-28 is/are pending in the application.
- 4a) Of the above claim(s) 16-23 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1,4,10-15 and 24-28 is/are rejected.
- 7) ☒ Claim(s) 11 and 14 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 June 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Election/Restrictions

1. Newly submitted claims 16-23 are directed to an invention that is independent or distinct from the invention originally claimed for the following reasons:
 - I. Claims 1, 4, 10-15 and 24-28, drawn to an arrayed waveguide grating device, classified in class 385, subclass 37.
 - II. Claims 16-23, drawn to a method of forming a two arrayed waveguide grating device, classified in class 398, subclass 87.
2. The inventions are distinct, each from the other because of the following reasons:
3. Inventions I and II are unrelated. Inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different modes of operation, different functions, or different effects (MPEP § 806.04, MPEP § 808.01). In the instant case invention I is not the same as the product of invention II. The product produced by invention II is a device requiring two array waveguide grating structures, while the product of invention I is a single array waveguide grating device.
4. Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 16-23 are withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

Specification

5. The substitute specification filed 12/25/02 has not been entered because it does not conform to 37 CFR 1.125(b) because: there are still numerous errors in the specification. Errors appear as follows:

- a. Page 16, line 25, "Wt" is incorrect.
- b. Page 17, lines 4-7 are awkward.
- c. Page 17, line 22, "Wp" is incorrect.
- d. Page 18, line 23 refers to alpha as a constant, but alpha appears to be a variable based on later descriptions.
- e. Page 21, line 5 is awkward.
- f. Page 21, line 19, "Wt" is either incorrect or is not shown in the drawings.
- g. Page 24, lines 3-5 are awkward.
- h. Page 24, line 18, "tempered" seems unintended.
- i. All references to specific claims in the specification should be removed. It is improper to refer to the claims in the description, since the claims should have antecedent to the specification, and not vice versa. A further impropriety in the reference is that the description refers to claims that are now non-elected, and, upon allowance and re-numbering of the claims, the claims discussed in the specification will not correspond in scope or content to the claims when prosecution closes.

6. Please submit a new substitute specification in accordance with 37 CFR 1.125.

Drawings

7. The drawings are objected to under 37 CFR 1.83(a) because they fail to show "L" as described in the specification for Figure 8 on page 18. Any structural detail that is essential for a

proper understanding of the disclosed invention should be shown in the drawing. MPEP § 608.02(d). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

8. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference sign(s) not mentioned in the description: “Z”, in Figure 8; “W” in Figure 10. A proposed drawing correction, corrected drawings, or amendment to the specification to add the reference sign(s) in the description, are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

9. The drawings are objected to because Figure 3, item 108 should reference a “DMUX”. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

10. Figure 10 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Objections

11. Claim 11 is objected to because of the following informalities: “Z” is not shown in the drawings, nor described in the specification, as set forth in the claim. Further, there is no relationship in the drawings between “L” and “Z” to give the claimed meaning to the portion of

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the equation “(L-Z)”, since “Z” is shown presumably as an axis, and “L” is not shown at all. For examination purposes “(L-Z)” will be interpreted to be some measurement of a portion of the parabolic waveguide part. Appropriate correction is required.

12. Claim 14 is objected to because of the following informalities: “said first sector slab” has no proper antecedent. For examination purposes, the first slab waveguide of claim 1 will be understood as the antecedent. Appropriate correction is required.

Claim Rejections - 35 USC § 112

13. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

14. Claim 15 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The specification does not enable nor adequately describe a “waveguide part *formed in common* with varying wavelengths” as set forth in claim 15 (emphasis added).

Claim Rejections - 35 USC § 102

15. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

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16. Claims 24-25 are rejected under 35 U.S.C. 102(e) as being anticipated by Han (US 6,188,818).

17. Regarding Claim 24, Figures 1 and 2 of Han teaches an arrayed waveguide grating comprising a substrate, a first channel waveguide (210) disposed on the substrate (110), a parabolized channel waveguide array (114), disposed on said substrate, comprising parabolized waveguides, a first slab waveguide (212) disposed on said substrate and connecting said first channel waveguide with said parabolized channel waveguide array, a second slab waveguide (216) disposed on said substrate and connecting an end of said channel waveguide array on the side wherein said first slab waveguide has not been connected thereto with an end thereof.

18. Regarding Claim 25, Han teaches the parabolized channel waveguide array is formed such that each length of said parabolized waveguides is sequentially longer (Figure 1, 114, particulars).

Claim Rejections - 35 USC § 103

19. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

20. Claims 1, 10-12 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Han (US 6,188,818) in view of Okawa (US 6,069,990).

21. Regarding Claim 1, Figures 1 and 2 of Han teach an arrayed waveguide grating comprising a substrate (10), a first channel waveguide (210) disposed on the substrate, a parabolized channel waveguide array (114, 214) disposed on a substrate and constituted such that

each length of parabolized waveguides in the parabolized channel waveguide array is sequentially longer with a predetermined difference between the lengths of the waveguides, a first slab waveguide (212) disposed on said substrate and connecting said first channel waveguide with said parabolized channel waveguide array, a second slab waveguide (216) disposed on said substrate and connected an end of said channel waveguide array on the side wherein said first slab waveguide has not been connected thereto with an end thereof, and a second channel waveguide (218) disposed on said substrate and connected to the other end of said second slab waveguide wherein a waveguide part having a tapered configuration. Han teaches other shapes for the taper are feasible (Column 7, lines 5-9), and that the taper is designed in order to have a final frequency response having a centrally-dipped profile in order to increase flatness of the spectral response (Column 6, lines 40-45 and Figure 6).

22. Han does not specifically teach a parabolic configuration for the waveguide part.

23. Okawa teaches a similar arrayed waveguide as Han, but additionally teaches a parabolized waveguide part (Figures 3B and 3D) for outputting optical signals (Column 7, lines 35-41). Figure 4 also teaches a centrally-dipped profile, and Figures 5A-6B teach increased flatness of the spectral response. The dip of Okawa is greater than the dip of Han, and the flatness of Okawa is flatter than Han.

24. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the parabolic waveguide part of Okawa in the system of Han since the parabolic waveguide part enhances the flatness of the spectral response by at least causing a greater central-dip of the frequency response.

25. Regarding Claim 10, the parabolic configuration of Okawa can be defined by a quadratic function (Figure 3D).
26. Regarding Claim 11, Okawa teaches a width of the waveguide part equal to $\{2(\alpha)(\lambda)/(\eta_{eff})(L-Z) + W_c^2\}^{1/2}$ as set forth in the claim (Figure 3D).
27. Regarding Claim 12, Okawa teaches a waveguide part having a core width measuring from approximately one to five times a width of a Gaussian distribution produced in a boundary between the second slab waveguide and the second channel waveguide, since Okawa teaches a Gaussian-shaped signal passing through the waveguide part (Particulars of Figures 5A-6B).
28. Regarding Claim 26, Han teaches a waveguide part (Figure 3 and Figure 2, enlarged portion) and a second channel waveguide (118) disposed on said substrate and connected to the other end of said second slab waveguide. Han teaches other shapes for the taper are feasible (Column 7, lines 5-9), and that the taper is designed in order to have a final frequency response having a centrally-dipped profile in order to increase flatness of the spectral response (Column 6, lines 40-45 and Figure 6).
29. Han does not specifically teach a parabolic configuration for the waveguide part.
30. Okawa teaches a similar arrayed waveguide as Han, but additionally teaches a parabolized waveguide part (Figures 3B and 3D) for outputting optical signals (Column 7, lines 35-41). Figure 4 also teaches a centrally-dipped profile, and Figures 5A-6B teach increased flatness of the spectral response. The dip of Okawa is greater than the dip of Han, and the flatness of Okawa is flatter than Han.
31. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the parabolic waveguide part of Okawa in the system of Han since the

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parabolic waveguide part enhances the flatness of the spectral response by at least causing a greater central-dip of the frequency response.

32. Claims 4, 13 and 27-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Han and Okawa in view of Okamoto (JP 10-197735).

33. Regarding Claims 4, 13 and 27-28, Han and Okawa teach a parabolized array waveguide grating with parabolic waveguide part above. Okawa implies that the waveguide part may be adjusted individually for each waveguide, and therefore, each wavelength, of the array waveguide grating (Column 7, lines 19-25).

34. Han and Okawa fail to explicitly teach the grating wherein the waveguide part is individually adjusted in response to respective wavelengths of multiplexed optical signals input to a first channel waveguide, and therefor also fails to explicitly teach the parabolic waveguide part is adjusted to compensate for varying optical transmission widths and insertion loss of the optical transmissions.

35. Okamoto teaches a parabolic waveguide part individually adjusted in response to respective wavelengths of multiplexed optical signals input to a first channel waveguide for the purpose of obtaining flat light frequency characteristics (Solution) and adjustment of the waveguide part to compensate for varying optical transmission widths (Particulars of W₁, W₂ and W₃) and insertion loss of the optical transmission (Problems to be Solved by the Invention).

36. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the parabolic waveguide part adjusted as taught by Okamoto in the

device of Han and Okawa in order to obtain flat light frequency characteristics and reduced optical loss (Okamoto, Solution and Problems).

37. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Han and Okawa in view of Dragone (US 5,002,350).

38. Han and Okawa teach a parabolized waveguide grating with a parabolic waveguide part on a second slab waveguide above.

39. Han and Okawa fail to teach a first slab waveguide with a parabolic waveguide part as set forth.

40. Figure 1 of Dragone teaches an array waveguide grating between two slab waveguides. The slab waveguides each have, and are further connected to, an additional channel waveguide. The slabs have parabolic waveguide parts (Equation 8) at the interfaces of the channel and array waveguides for the purpose of causing negligible higher order mode generation (Column 1, lines 57-68).

41. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include in the device of Han and Okawa a second parabolic waveguide part on the first slab as taught by Dragone for the purpose of causing negligible higher order mode generation (Dragone, Column 1, lines 57-68).

Response to Arguments

42. Applicant's arguments with respect to claims 1 and 4 have been considered but are moot in view of the new ground(s) of rejection. While Applicant shows "parabolized" channel array

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waveguides in Figure 5, this limitation was not previously claimed and introduces a new limitation to the claims.

43. Applicant's arguments filed 06/28/01 have been fully considered but they are not persuasive. Dragone's teaching are still relevant to the instant invention for at least teaching non-linear, parabolic, waveguide parts interposed between slab and channel waveguide parts.

Conclusion

44. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

45. A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

46. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Krystyna Suchecki whose telephone number is (703) 305-5424. The examiner can normally be reached on M-F 8-6, with alternating Fridays off.

47. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Glick can be reached on (703) 308-4858. The fax phone numbers for the

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organization where this application or proceeding is assigned are (703) 872-9318 for regular communications and (703) 872-9319 for After Final communications.

48. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-4900.

ks

July 14, 2003


EDWARD J. GLICK
Supervisor, Patent EXAMINER
TECHNOLOGY CENTER 2800